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NOTES FOR STUDENTS.

DR. LUIGI BUSCAGLIONI suggests the use of "Sudan III" in botanical microtechnique. It stains wax, cutin, and suberin intensely red, while cellulose membranes, collenchyma, gelatinous and lignified membranes remain uncolored. Of the cell contents the nucleus, nucleoli, protoplasm, starch grains and tannins remain unstained; while fats, resins, and latex stain bright red, and the chloroplasts pale red.—C. R. B.

BRONISLAW DEBSKI³ finds that during oogenesis in *Chara* there is no reduction in the number of chromosomes. After the breaking down of the nuclear membrane, but before the formation of the spindle, protoplasmic radiations may be seen around the nuclear cavity. Spindle development was not followed in detail, but Debski is inclined to think that it is at first multipolar. The cell plate arises from thickenings of the connecting fibers. In the nuclei of nearly all mature cells changes occur in the nucleoli and nuclear network. These changes lead to fragmentation of the nucleus and such cells are no longer capable of division. The cell wall in *Characeæ* shows no cellulose reaction with chlor-iodide of zinc or with iodine and sulfuric acid.

In a previous article Debski showed that no reduction in the number of chromosomes takes place during spermatogenesis in *Chara*.—CHARLES J. CHAMBERLAIN.

PARTHENOGENESIS in plants is, to say the least, a very rare phenomenon, *Chara crinita*, species of *Saprolegnia*, and perhaps *Marsilea Drummondii* furnishing the only fairly proven cases among cryptogams. In *Cælebogyne ilicifolia*, formerly believed to be parthenogenetic, it is now known that the embryos developed from nucellar tissues and not from an unfertilized egg. Kerner assumed parthenogenesis in *Antennaria alpina* because pistillate plants developed seed when no staminate plants were in the vicinity. *Mercurialis annua* is also said to be parthenogenetic.

H. O. Juel⁴ has made a careful survey of the embryology of *Antennaria alpina*. He reports that generally only pistillate plants are to be obtained, and even when staminate plants are found the pollen is either entirely lacking or feebly developed. The development of the embryo sac is normal up to the eight-celled stage. The antipodals continue to divide and form quite a tissue. The polar nuclei do not fuse, but each divides independently and contributes to the endosperm, so that, like the egg, they are capable of division without a previous fusion. This seems to be a perfectly proven case of parthenogenesis.—CHAS. J. CHAMBERLAIN.

³ Weitere Beobachtungen an *Chara fragilis*. Jahrb. f. wiss. Bot. **32**: 636-670. *pl.* 11-12. 1898.

⁴ Bot. Centralbl. **74**: 369-372. 1898.

ITEMS OF TAXONOMIC INTEREST are as follows: A good figure of *Hypericum galioides* Lam. has been published in *Gardener's Chronicle* (III. 24 : 301. 1898).—*Beckwithia* is a new genus of Ranunculaceæ, described by W. L. Jepson (*Erythea* 6 : 97–99. 1898). The single species, *B. Austinae*, is said to be so strikingly like *Viola Beckwithii* in habit as to have suggested a possible teratological form of that species. The affinities of the genus are uncertain, suggesting *Anemone* in general appearance, and *Pæonia* in its more technical characters. The flowers have not been seen. The plant was discovered in Modoc county, California.—John W. Harshberger has published (*Proc. Philad. Acad.* 1898 : 372–413) the results of his recent observations upon the Mexican flora, made mostly in the Valley of Mexico. A catalogue of species is given, with critical notes.—In the current *Bull. Torr. Bot. Club* (25 : 561–565. 1898) George V. Nash has published a revision of *Triplasis*, a group of grasses frequently placed under *Triodia*. Three species are recognized, *T. purpurea*, *T. intermedia* (a new species), and *T. Americana*. In the same journal (580–582) A. A. Heller continues his presentation of new and interesting plants from western North America, including a new *Hydrophyllum* from Washington.—Janet R. Perkins has published (*Engler's bot. Jahrb.* 25 : 547–577. 1898) some of the results of her investigation of the Monimiaceæ. After a discussion of the general features and taxonomic characters of the group, the author presents a synopsis of the Mollinediæ, including ten genera, five of which are proposed as new (*Macropeplus*, *Macrotorus*, *Steganthera*, *Anthobembix*, and *Tetrasynandra*).—Under the title “Phycological Memoirs” DeAlton Saunders has begun a series of papers in *Proc. Calif. Acad. Sci.* (III. 1 : 147–168. 1898, with 21 lithograph plates). This first contribution considers “Some Pacific Coast Ectocarpaceæ,” and “Sphacelariaceæ and Encœliaceæ of the Pacific Coast.” Seven new species of *Ectocarpus* are described, also new species of *Sphacelaria*, *Scytosiphon*, and *Colpomenia*. A new genus of Encœliaceæ is described, founded on *Punctaria Winstonii* Ands., and named *Halorhipis* (“sea-fan”)—J. M. C.

IN CELEBRATION of the twenty-fifth anniversary of the doctorate of Dr. Melchoir Treub, director of the botanical garden at Buitenzorg, the publishers of the *Annales* of the garden have issued a supplement (pp. 167, *pl.* 9) containing twenty-three short papers prepared by some of those who have been accorded the privileges of the garden, both botanists and zoologists. Solms Laubach describes the development of the ovule and seed of *Rafflesia* and *Brugmansia*. Molisch discusses the bleeding of tropical trees in full leaf, the pressure in the night often exceeding two atmospheres. Haberlandt describes the movements of the leaves of *Biophytum*, and believes the transmission of impulses to be through plasma connections in the cells of the vascular bundles. Schiffner establishes a new genus of Hepaticæ, *Wettsteinia*, based on *Plagiochila inversa* Sande Lac., and *Tylimanthus scaber* Schiff. Karsten presents

some new researches on the formation of auxospores in diatoms. Goebel shows that in all observed Muscineæ the wall of the antheridium is active in dehiscence, and is not merely ruptured by the swelling contents. Went points out a periodicity in the blooming of *Dendrobium*; Ewart has a general paper on physiological research in the tropics; Wiesner describes a new form of false dichotomy in the shoots of woody plants; Massart writes on epiphyllous plants, represented by algæ, lichens, hepatics, and mosses. Warburg emphasizes the antithesis between the tropical strand flora of America (incl. West Africa) and that of Asia (incl. East Africa). Boerlage describes the manner of floating and the germination of the fruits of *Heritiera littoralis*, a coast tree of all the Malayan islands. Kamienski describes a new terrestrial *Utricularia* which he dedicates to Treub under the name *U. Treubi*. Besides these there are several other botanical papers of less general interest.—C. R. B.

IN A PAPER just published⁵ by Dr. R. H. True and C. G. Hunkel, on the poisonous effect exerted on living plants by phenols, the authors summarize their results as follows:

"We find, as far as our knowledge of the dissociation of the phenylic compounds permits us to draw conclusions, that, except in isolated instances electrolytic dissociation plays but a very subordinate rôle in determining the toxic properties of these substances. Picric and salicylic acids strongly dissociate and become powerfully poisonous by virtue of the H ions, in great measure. Pyrogallol and probably methyl salicylate first undergo other molecular changes, after which their products dissociate electrolytically. Here the H ions may account for much of the toxic action. In the cresols and mono-nitrophenols, electrolytic dissociation seems to exert a pronounced influence. Some phenols are comparatively weak in their integrity, but quickly change to substances containing constituents even more fatal than H ions. Pyrocatechol, and especially hydroquinone, are of this class.

"Certain radicles seem to have specific properties when introduced into the molecule, modifying the toxic value. The number of hydroxyl groups (OH) present seems to have little influence on the toxic action of the phenols, as in the series: benzophenol (1 OH), resorcinol (2 OH), and phloroglucin (3 OH). The introduction of the methyl group (CH₃) into the benzene nucleus increases the toxicity to a considerable, but rather variable, degree, as in the cresols, less plainly in orcinol. The introduction of the isopropyl group (CH (CH₃)₂) into the cresols increases the toxic value of these substances, as carvacrol and thymol. The presence of one or more nitro groups (NO₂) increases the toxic action to a great degree; *e. g.*, mono- and tri-nitrophenols. An increase in the number of the NO₂ groups present does not seem to increase the toxic action. When the H of an OH group is replaced

⁵ Botanisches Centralblatt 76 : — seqq. 1898.

by a CH_3 group, little influence seems to be exerted on the toxic action, *e. g.*, anisol and guaiacol. The carboxyl group (COOH) brings with it a degree of toxicity corresponding directly to the degree of dissociation and the number of H ions it affords, *e. g.*, salicylic acid."—C. R. B.

MR. A. A. LAWSON⁶ has investigated the earliest stages in the formation of the multipolar spindle in the pollen mother-cells of *Cobæa scandens*. The cytoplasm of the resting pollen mother-cell presents a clear uniform appearance, but as division approaches a zone of granular substance accumulates about the nucleus. This zone is so constant in *Cobæa* and other genera examined by the writer that he proposes to designate it by the term *perikaryoplasm*. The zone was observed in living cells and so could not be regarded as an artefact. When the nuclear membrane breaks down, the perikaryoplasm and the linin of the nucleus form a network of kinoplasmic fibers. These grow out into several projections and become the cones of the multipolar spindle. Spindle fibers are formed by the elongation of the meshes of the network. The cones elongate, become sharp pointed and fuse in two groups, thus forming a bipolar spindle. The mature spindle is characterized by the great length and crossing of the mantle fibers. Spindle formation in the second division of the pollen mother-cells is the same as in the first. No centrosomes were observed at any stage of the process.

Fleming's fluid was used for fixing, and the safranin-gentian violet-orange for staining. The reviewer would suggest that while these form a combination of unusual value, it would nevertheless be refreshing to find some other combination thoroughly perfected, especially since it has been claimed by competent observers that mixtures containing chromic acid precipitate certain of the liquid albuminoids of the tissues in the form of filaments or networks, which are often of great regularity and simulate structural elements of the tissues. If this objection is well founded, it applies with especial force to such problems as those concerning spindle formation.—CHARLES J. CHAMBERLAIN.

IN AN ARTICLE of some seventy pages,⁷ Dr. Georg Klebs gives a detailed account of many ingenious and conclusive experiments regarding the nature of the sexual and asexual reproductive organs of *Sporodinia grandis*, and the causes which determine their occurrence.

Of the physical factors, those which heighten transpiration increase the tendency to the formation of sporangia. When transpiration is checked, within certain limits, the sporangia are partially replaced by zygotes, and when transpiration is still further checked, only zygotes are formed. Thus, with a relative humidity of 100 per cent. only zygotes are produced; at 45–

⁶Proc. Cal. Acad. Sci. III, 1: 169–184. *pl.* 33–36. 1898.

⁷KLEBS, GEORG:—Zur Physiologie der Fortpflanzung einiger Pilze. Jahrbücher für wiss. Bot. 32: 1. 1898.

65 per cent. sporangia only; below 40 or 42 per cent. the mycelium is sterile. But sporangia may be produced in a greater humidity if anything, *e. g.*, a current of air, promotes transpiration.

When the air pressure is reduced to 40 or 60^{mm} of mercury parthenogenesis results; below 20–25^{mm} no sex organs are formed, and below 15–20^{mm} no sporangia develop.

In discussing the food supply it is proved that carbohydrates are needed to form zygotes, while sporangia may be formed luxuriantly in nitrogenous media.

It is of interest to note that different isomeric compounds may behave differently. Thus maltose provides the food needed for zygote production while lactose does not. Unfortunately, stereoisomers were not investigated. The minimum concentration in which zygotes could be formed was determined; for this was shown to depend upon the concentration rather than upon the absolute quantity of food present. A small quantity of acid salt favored zygote building while normal salts and acids retard it. The author thinks the favorable substances increase the permeability of the protoplasm to nourishment.

Parthenogenesis in general results when conditions are suited to the production of sex organs and then change so as to restrict their functioning. It results with the greatest certainty when the plant grows in a reduced atmospheric pressure, *e. g.*, about 50^{mm}.

As a result of the work, the view of Brefeld, that the determination of the kind of organs to be produced comes from within, must be abandoned. Also the prevalent notion that zygotes are made in "hard times" finds little support, as in nearly every case their formation is more easily arrested than that of sporangia.

Since in luxuriant vegetative growth diminished humidity, permitting transpiration, results in the formation of sporangia, the latter may be regarded as shortened branches rendered fertile by the extra supply of nourishment at their disposal, or by some as yet unknown stimulus.

Sporangia and zygotes are morphologically homologous organs, developing from aerial hyphæ of the same construction. They are similar physiologically and can develop only in air. The stimulus which calls them forth is transpiration, but the optimum for each lies at a different point; higher for sporangia, lower for zygotes.

The fact that aerial hyphæ are subject to a molecular impact different from that on the submerged hyphæ may be a determining factor in the development of reproductive organs. Also the fact that submerged hyphæ may absorb nourishment osmotically through a great area while an aerial branch receives it through a relatively small cross section may account for some of the differences between aerial and submerged parts of fungi, and of higher plants as well. — F. L. STEVENS.